

and Platt, runs along one, and in it will be placed the lathes, drilling machine, planing machine and other tools. The other bay is for experimental work. It is traversed by a 2-ton crane, and will contain a testing machine and machinery for testing steam-pressure gauges, indicators and such instruments.

With regard to gifts to the Laboratory, it has already been mentioned that the Drapers' Company has undertaken to provide the sum of 700*l.* to meet the cost of a Lorenz apparatus, in memory of the late Principal Viriamu Jones. Messrs. Willans and Robinson are providing apparatus for testing steam-pressure gauges and indicators, while in a number of cases very advantageous terms have been granted to the committee by manufacturers of tools and machinery. Lord Rayleigh, Lord Kelvin, Mrs. Hopkinson, and the Syndics of the Cambridge University Press have presented valuable books. Lady Galton has given a valuable astronomical clock with electric contacts, in memory of the late Sir Douglas Galton.

But though much has been done, the Laboratory is far from complete. Rather more than 3000*l.* has been spent on apparatus, but visitors will notice many gaps before the important problems which lie to hand can be fully grasped. Still, it is now possible to make a start, and to show, by the work done with the means at the disposal of the staff, that the Laboratory is fulfilling a need and that it deserves the support of those who are concerned in facilitating the application of science to industry. The pious benefactor, however, who will put it as regards equipment on a footing comparable with the Reichsanstalt is still to seek.

In research work it is hoped that the investigations of the Alloys Research Committee may be continued. Much, though not all, of the apparatus required for this has been purchased; a recording pyrometer, however, must be added to the outfit before it is complete. Prof. Barrett's paper read at the Institution of Electrical Engineers recently showed the importance of the aluminium steels for dynamo and transformer manufactures, and with the kind assistance he then offered it is hoped that a start may soon be made on their investigation.

The measurement of wind pressure is of great importance to engineers; with the help of Sir Benjamin Baker, an investigation will be made into this subject.

In thermometry, the object will be to arrange for the more systematic and ready measurement of the high temperatures met with in industrial undertakings.

As to the commercial testing work which is to be undertaken, the following list will indicate its scope, though until the Laboratory standards have been more thoroughly studied it is hardly possible to do much on a large scale:—

- Tests of pressure gauges and steam indicators.
- Tests of measuring appliances and gauges for use in engineering shops, &c.
- Test of screw gauges.
- Tests of thermometers for the measurement of high or low temperature, the platinum thermometer, thermopiles, &c.
- Photomicrographic tests on metals, steel rails, &c.
- Measurement of the insulation resistance and dielectric capacity of insulators.
- Measurement of the electrical resistance of conductors.
- Tests of capacity and induction and of various forms of electrical measuring apparatus.
- Tests on the magnetic properties of iron, &c.
- Standardisation of glass vessels, flasks, burettes, &c., used in chemical laboratories and in various industries—*e.g.* the dairy trade.
- Standardisation of weights and scales for laboratory purposes.
- Testing of photographic and other lenses.

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The director hopes before long to issue a pamphlet giving some account of these various tests, together with a statement of fees charged.

Thus an ample programme has been prepared, and it is interesting to learn on the authority of the director that some slight demand has already shown itself for nearly all the tests enumerated in the list.

PROPOSED ORGANISED RESEARCH ON CANCER.

WE are pleased to learn that a scheme has recently been elaborated in this country for the purpose of systematising and procuring endowment for research upon cancer. In this respect our country is already somewhat behindhand, since a similar organisation has been for some time in full activity in Germany. A large sum of money has been placed at the disposal of Prof. Ehrlich, and a German cancer committee, with Prof. von Leyden as president, is now at work. To this purpose the German Government has already made grants of upwards of 50,000 marks. In America there is a State-subsidised cancer laboratory at the present time, under the direction of Prof. Roswell Park, concerning the work of which some account was given in the *Medical Record* last May. In France, cooperative work upon cancer is also already in progress, a special journal being devoted to the publication of the results.

It will be unnecessary to enter here into the details of the scheme; suffice it to say that any funds will be invested in the names of five trustees, and that the income derived from them will be paid over to a general committee consisting of these trustees and three representatives of the College of Physicians (the president and two censors), three representatives of the College of Surgeons (the president and two vice-presidents), the members of the laboratories committee of the Royal Colleges of Physicians and Surgeons, and one member, to be nominated by the Local Government Board. The general committee will have control of the income of the fund, but concerning the exact method of spending it they will take counsel with an advisory board, which will consist of the laboratories committee of the Royal Colleges and other members chosen in equal numbers by each of the Royal Colleges. It is estimated that the sum of 100,000*l.* will be required for the above purpose. At the present time, funds are conspicuous by their absence.

To the lay mind the term cancer does not imply a well-marked entity; the word is, in fact, occasionally used as synonymous with tumour, meaning, roughly, a swelling or growth where a swelling or growth ought not to be. To the medical mind the term cancer means a special form of tumour which is characterised microscopically by its structure and clinically by its method of growth. This latter is of two kinds, local and general. The local growth consists of an infiltration of the adjacent tissues, the general growth of a dissemination of the particles of the disease which produce growths, conforming in type to the original tumour, in parts of the body more or less remote from the seat of the primary affection. So far as concerns their minute structure, however, tumours growing in the above manner are not all, from the histological standpoint, cancers or carcinomatous. This term has been made by morbid histologists conventionally to designate a definite variety of tumours growing in the above-stated "malignant" manner, viz. those the microscopic structure of which is of the epiblastic or epithelial type. This classification is rendered necessary by the fact that there exists another class of tumours equally malignant, but the minute structure of which is of the connective-tissue or mesoblastic type. These tumours

are termed "sarcomata," a term as meaningless as its congener, carcinoma. We have, then, speaking roughly, two great classes of tumours, the so-called innocent tumours, or those which grow slowly and locally, and the malignant tumours, which grow rapidly and become disseminated all over the body. This latter group, although consisting of two classes, the carcinomata and sarcomata, are generally designated "cancers," and are, no doubt, although, so far as we can ascertain, no specific information is to hand upon the subject, to be the objects of the proposed research.

As very often happens when facts of unmistakable significance are wanting, theories are abundant. This is certainly true of cancer. It must at once be admitted of the theories with regard to the causation of cancer, that although they have no doubt been of great value in assisting what may be termed the crystallisation of histological results, they have, tending as they do rather to express one enigma in terms of another, been of little value from the absolute practical standpoint. Six distinct theories have been put forward concerning the pathogenesis of cancerous growths. Perhaps one of the most generally accepted is Prof. Virchow's theory that these growths are caused by injury or chronic mechanical irritation. There can be no doubt that cancerous growths very frequently affect the parts of the body, either external or internal, which are most frequently subjected to some kind of irritation. Cancer of the tongue in clay-pipe smokers or in the subjects of rough and uneven teeth, cancer of the scrotum in chimney sweeps, due to chronic irritation of the part by soot, &c., cancer of the breast, of the arms in paraffin and tar workers, of the two ends of the stomach, especially apparent in individuals who masticate imperfectly, can all be cited as showing the predilection of cancerous growths to parts of the body exposed to constant or intermittent irritation. Perhaps of all the numerous common factors in cases of cancer, chronic irritation is the most constant. It cannot, however, be regarded as a universal or even adequate explanation of the disease, for, as Cohnheim has pointed out, in 86 per cent. of all the cases irritation apparently plays no part. Prof. Cohnheim regards cancerous growths as being due to the abnormal proliferation of embryonic remnants. He assumes that in the development of the individual from the embryo, more cells are produced than are required for the building up of the organ concerned. There thus remains an embryonic cellular remnant. These embryonic cells remain always possessed of one characteristic of this variety of cell, viz. an unlimited capacity for proliferation. These remnants may remain quiescent, and then nothing more is heard of them; they may, however, under the influence of certain conditions, assume active growth, and may thus constitute malignant tumours. There can be no doubt that this theory explains many of the features of cancerous growths, and is greatly supported by the fact that, speaking generally, new growths are prone to occur in parts of the body which are the seats of complicated embryonic development. We have, however, some actual knowledge of embryonic remnants in the so-called epithelial pearls which are fairly frequently found in the tonsils, and it must be admitted that these organs are rarely the seats of malignant growths. Further, in Cohnheim's theory the actual cause which stimulates the growth of the embryonic remnant is not defined except in the most general terms, viz. as a condition of malnutrition of the surrounding tissue.

The obvious similarity between malignant growths and the so-called infective granulomata has led many observers to the view that the former disease must, like the latter, have a parasitic origin. The analogy between these two classes of affection is perhaps the greatest when we take tuberculosis as the type of the infective

malady. Tuberculosis at first local, confined, for instance, to a given part of one organ, produces secondary infection in the adjacent lymphatic glands by means of the lymphatics, and subsequently from these tubercular material may gain entrance into the general circulation, and being carried by it hither and thither may become implanted in the most remotely situated organs and produce tuberculosis of them. In the case of cancer there is, too, always a primary focus which is strictly local, and in this case also the lymphatic vessels carry the carcinomatous material to the adjacent glands and from them either by means of the general lymphatic system or the general circulation, carcinoma of remote organs may ensue. When we come, however, to examine this analogy, we find that it is more apparent than real. Tuberculosis can readily be conveyed from animal to animal; this certainly is not the case with cancer. It is true that examples of what may be termed the auto-inoculation of cancer in man are not uncommon; for instance, in the case of adjacent parts of the body, cancer of the one may spread to the other; this probably simply means that the cancerous tissue of the one organ becomes ingrafted upon the other. This condition is often referred to as "contact cancer." Ebert has collected twenty-three such cases. The actual infectivity of cancer, using this term in the ordinary sense, is at present doubtful, although several instances are recorded of what may perhaps best be expressed by the French term, "cancer a deux." Nineteen such cases are given by Behla; in most instances the persons affected were man and wife. Some instances are also on record of surgeons inoculating themselves accidentally with cancer from the cancers of patients upon whom they were operating.

The similarity between malignant disease and tuberculosis has led numerous investigators to seek for an organism which would bear the same causative relation to cancer as the tubercle bacillus does to tuberculosis. Carcinomata have received more attention at the hands of these investigators than sarcomata. Into the details of these most interesting researches the space at our command forbids us to enter. The main point of difference between the adherents of the parasitic theory of the origin of cancer and their opponents centres upon the significance of certain undoubted microscopic appearances, chiefly of the growing portions, of cancerous growths. Some observers maintain that these microscopical appearances represent an organism of a protozoic type, others regard them as due to degeneration of the cancer cells. The majority, however, of microscopists do not regard the presence of a parasite in cancerous growths as proved. In the case of sarcomata, the parasite is supposed to be, not of animal, but of vegetable origin, probably a torula.

If we turn from the study of the hypothetical cancer parasite to a consideration of the influence of general climatic conditions upon the incidence of cancer, we shall be treading upon more certain ground. The existence of so-called "cancer houses" seems to rest upon very strong evidence. In one instance, six persons within twenty-six years died of cancer in two houses that were under one roof and had a common drainage and water-supply. The inhabitants affected were for the most part unrelated to each other. So intimate appears to be the connection between the existence of cancerous disease and locality that so-called "cancer fields" have been described. These are found in "sheltered and low-lying vales traversed by fully formed and seasonably flooded rivers and composed of the more recent argillaceous formations." Districts, on the other hand, which possess the lowest cancer death rate are generally more or less elevated areas composed of the oldest rocks, especially limestone. The difference between the death rates from cancer in different regions in north Germany

is very marked. In certain neighbourhoods cancerous disease is responsible for one in every hundred deaths, whereas in others one in every thirty-three deaths is due to this cause.

Concerning the—from the public standpoint—most interesting question whether or not cancer is on the increase, there seems to be some difficulty in giving an unequivocal answer. That the mortality statistics show an increase is certain, but increased longevity and increased accuracy of diagnosis are disturbing factors in the drawing of inferences and have led many statisticians to regard this increase as more apparent than real. So far as the United Kingdom is concerned, the class of cancerous disease showing the most marked increase is that of the digestive organs, and this has led to the formulation of hypotheses with regard to the relation between the increase of meat-eating and the increase of cancer. The greatest note of alarm with regard to the future of cancer comes from America. It is estimated that in Buffalo during the last fifty years the death rate from cancer has increased five-fold, and that if this increment is maintained, at no very distant date this disease will be responsible for more deaths than tuberculosis, typhoid fever and small-pox all put together.

From the above paragraphs, which must be regarded rather in the sense of jottings of facts, the interest and the importance of this subject will be evident. It seems, further, that the mere microscopic examination of malignant growths has already yielded up to the observer almost all the information it can do, and that it is in the direction of pathological experiment that new and important truths should be sought for, and will probably be found. With the history of the recent progress of the treatment of zymotic diseases before us, doubtless the factors possibly concerned in cancer immunity will not escape the attention of investigators. It is sincerely to be hoped that the public will respond liberally to the call which is being made upon them for funds to defray the expenses necessarily required for an investigation at once so time-consuming and so important.

F. W. TUNNICLIFFE.

THE OWENS COLLEGE JUBILEE.

THE series of functions at the Owens College, Manchester, last week, in celebration of the jubilee of the foundation of the College, was carried out with complete success. Prof. S. Hickson was master of the ceremonies, and to him, assisted doubtless by the harmonious cooperation of many others, the greatest credit is due.

The programme on March 12 commenced with the opening of the beautiful Whitworth Hall by the Prince of Wales. The Duke of Devonshire, as president of the College, eulogised the high aims and ideals of John Owens, the founder, in eloquent terms. The Prince of Wales urged on the citizens of Manchester not to be content with the magnificent results of the past liberality of such benefactors as Owens, Beyer, Christie, and Whitworth, but to follow them in liberal support and extension of the College. He pointed out that "the work of an institution of this nature must continually expand; and it must not be forgotten that its material resources must also expand as the work grows." He appealed most forcibly to the generous municipal life and patriotism to enable the College "to keep abreast of the ever-growing demands of modern life."

Sir Richard Jebb and Principal Rücker delivered admirable addresses upon the influence which the College has exerted upon progress in literature and science. The ceremony showed convincingly that the Whitworth Hall justified its dignified beauty of design, by conveniences of access and arrangement and most favourable acoustic qualities. The conversazione in the evening

afforded the foreign delegates an opportunity of seeing the Manchester Museum, the whole of the Arts and Science Departments, and the new Christie Library opened four years ago.

On March 13 the actual jubilee celebration was held. Nearly one hundred delegates from academies, universities, colleges and learned societies at home and abroad came forward to present the congratulations entrusted to them and to receive the grip of greeting from the president of the College. The principal proposed the vote of thanks to the delegates, and dwelt on the regretted absence from their number, through illness, of his predecessor, Dr. Adolphus Ward, master of Peterhouse, and of Sir Henry Roscoe, to whom the College is deeply indebted in every way. Prof. Harold Dixon, in seconding the motion, confined himself to the followers of his own science, chemistry, and its sister, physics, and noted with pride the attainments of such as were present as delegates.

Earl Spencer, Chancellor of the Victoria University, then took the chair and admitted the distinguished recipients of honorary degrees. The public orators were the principal. Profs. Wilkins, Schuster, Young, Tout, and Lamb, and Dr. Hiles. Prof. Schuster's presentations were notable for their epigrammatic terseness and point; we may cite his presentation of Dr. Glaisher: "His mind was raised to infinite heights by his mathematical genius; it was brought back to earth by his love of the stars."

An informal "physics colloquium" in the laboratory afforded Prof. Becquerel the opportunity of demonstrating some of the remarkable properties of radium and showing, by shadow-photographs the analysis of the various kinds of rays it emits. Profs. Voigt and Nernst also gave interesting communications.

In the evening the court, the teaching staff and the delegates dined together in the Whitworth Hall. This function was a private one.

The students who had assisted as spectators on Wednesday and Thursday organised a torchlight procession followed by a smoking concert on Friday evening. Since then the shadows of the terminal examination have fallen on the College.

The following extracts from the complete reports of the ceremony given in the *Manchester Guardian* are of interest:—

The Duke of Devonshire, president of the College, in the course of his opening remarks, said that the idea of the founder was to provide higher education in such branches of learning and science as are usually taught in the English universities. The original idea was thus education of the university type, such as that which had prevailed at the old Universities of Cambridge and Oxford.

The foundation of the College coincided nearly in time with great discoveries in science, and at the same time with inventions which provided the means of using those discoveries for the purpose of industry, and it is these discoveries which have stimulated interest in those studies of natural science in which Owens College has been preeminently distinguished. This is the interest to which, in the main, Owens College has been indebted for its success. Students have no doubt been attracted by the eminence of some of its teachers from all parts of the country, but, in the main, those students have been drawn from Manchester and its immediate neighbourhood. They have come here doubtless with the desire, with the hope, of acquiring knowledge, that knowledge and training which would be of practical use to them in the future occupations of life. But, at the same time, Owens College has never been content to limit the range of its teaching to one or two subjects or one set of subjects. It has never been content to be merely a medical or a legal or a technical college, but it has set before itself the aim of teaching—of a true university type of teaching—which shall embrace all branches of knowledge.

The address from the College to the Prince of Wales was then read by the principal, and in his reply His Royal Highness remarked:—